



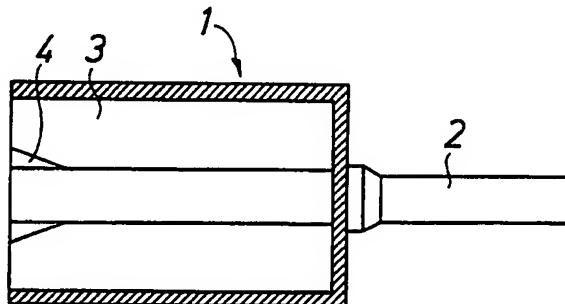
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(21) International Application Number: <b>PCT/SE92/00775</b> (22) International Filing Date: <b>11 November 1992 (11.11.92)</b>  (30) Priority data: <b>9103335-7 13 November 1991 (13.11.91) SE</b>  (71)(72) Applicant and Inventor: ROSENBERG, Mikael [SE/ SE]; Ågatan 35 B, S-295 34 Bromölla (SE).  (74) Agents: HOLMQVIST, Lars, J., H. et al.; Lars Holmqvist Patentbyrå AB, P.O. Box 4289, S-203 14 Malmö 4 (SE).  (81) Designated States: AT, AU, BB, BG, BR, CA, CH, CS, DE, DK, ES, FI, GB, HU, JP, KP, KR, LK, LU, MG, MN, MW, NL, NO, PL, RO, RU, SD, SE, US, European patent (AT, BE, CH, DE, DK, ES, FR, GB, GR, IE, IT, LU, MC, NL, SE), OAPI patent (BF, BJ, CF, CG, CI, CM, GA, GN, ML, MR, SN, TD, TG).	Published <i>With international search report. In English translation (filed in Swedish).</i>	

(54) Title: ANCHORAGE



(57) Abstract

The present invention consists of an anchorage arrangement in form of a socket (1) and anchor bolts (5) for anchoring scaffolds at walls or the like. The socket (1) has an inner cruciformed recess (3) with conical chamfers (4) which are adapted to the form of a conical extension (7) of the anchor bolts (5). When screwing in a anchor bolt (5) the eye (6) of the bolt (5) is placed in the recess (3) of the socket (1), whereby the cone (7) of the bolt (5) and said chamfers (4) cooperate partly to guide the application of the socket (1) onto the bolt (5) and partly to stabilize the bolt (5) in the socket (1) during the operation of screwing itself. The socket (1) is rotated e.g. by a drilling machine whereby the insert pin (2) of the socket is placed in the drill chuck. The cone (7) may be an integrated part of the bolt (5), but is preferably arranged screwable on the bolt (5).

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## ANCHORAGE

10        The present invention relates to an anchorage arrangement for e.g. anchoring of scaffolds at walls or the like, which arrangement consists of a screw socket and an anchor bolt.

15        At the mounting of scaffolds the scaffold must be anchored in a safe way. This is done by securing the scaffold at a large number of points by anchor bolts screwed into the wall at which the scaffold is mounted. Today this is normally done by first drilling a hole in the wall, and then hammering a plug into said hole, whereafter the anchor bolt is screwed 20 in manually in the wall in order to anchor the scaffold. It is both a tiresome and time consuming work to manually screw in the anchor bolts.

25        The background of the invention is the large strains, specially in the shoulders, experienced by scaffolders at the up to now used manual method to screw in anchor bolts. It has showed in practice that the installers, due to being pressed for time, often are careless with the important anchoring, as it is both time consuming and tiresome to screw in anchor bolts in the prescribed number. Of course this is unacceptable from the view point of security.

30        The use of the anchorage according to the invention is not limited to scaffolds but can be used anywhere when some kind of anchorage arrangement is needed. Examples of other fields of use are railings, fences, wire carriers, fire-ladders and lifting eye bolts for e.g. rocks.

35        Thus, the object of the present invention is to facilitate to screw in the anchor bolts by making it possible to use an ordinary drilling machine for the actual screwing in.

40        This object is met with an anchorage arrangement according to the enclosed claims.

When using the arrangement according to the invention a socket is placed in a drill chuck in the normal way. The socket has an inner cruciformed recess in which the eye of the anchor bolt fits. Furthermore, the anchor bolt is furnished with a cone which has a corresponding form to chamfers on the recess within the socket. The cone and chamfers partly acts to guide the application of the socket on the anchor bolt and partly to hinder the stem of the anchor bolt from striking against the inner of the socket during the screwing operation.

At scaffold mounting the normal distance from the plank platform on which one stands at the mounting of the anchor bolts and the hole in which the anchor bolt is to be screwed in is about 2 m, which gives a cumbersome working posture with large strain on particularly the shoulder part at the presently used method of manually screwing in anchor bolts. This work is facilitated by the invention by which one can use the same drilling machine for both screwing in of the anchor bolts and to drill the holes in the wall in which the anchor bolts are screwed in. By using a drilling machine the bolts are screwed in with a greater force, which expands the plugs in the wall more and gives a stronger anchoring. Due to the cruciformed recess of the socket with chamfering and the cone of the anchor bolt it goes fast and easy to screw in the bolts without the bolt stem striking against the socket. This becomes more important if the scaffold, as e.g. often happens at additional insulation, is mounted at a relative large distance from the walls whereby long anchor bolts must be used. Without the chamfers and the cone it would be very difficult to screw in the anchor bolts without them striking against the socket. Furthermore it is a clear risk that the anchor bolts will strike so much that they affect the hole in the wall.

When sheeting the scaffold, i.e. covering it with plastics, almost twice as many anchor bolts must be used due to the surface exposed to the wind.

The invention is more closely explained below by means of embodiments shown in the enclosed drawings, in which:

Fig. 1 is a sectional view of the socket taken along the line I-I in Fig. 2;

Fig. 2 is an end view showing the inner of the socket;

Fig. 3 is a side view of one anchor bolt;

Figs. 4a-4h are side views of different anchor bolts;

Figs. 5 and 6 are sectional views of the socket

5 furnished with magnetic rods and rubber coatings, respectively;

Fig. 7 is a sectional view of the socket furnished with rubber coatings in accordance with Fig. 6;

10 Fig. 8 is a sectional view showing a detail of one type of expander; and

Fig. 9 is a plan view of a socket intended for the anchor bolt according to Fig. 4e.

15 The present invention thus refers to a socket and anchor bolt arrangement for use in anchoring of scaffolds at walls or the like.

20 The arrangement consists of a socket 1 with a pin 2 for connection with e.g. a drill chuck and an anchor bolt 5. The interior of the socket 1 has a cruciformed recess 3, with chamfers 4. The anchor bolt 5 has an eye 6 and an extension in form of a cone 7 between the eye 6 and the bolt stem 8. Furthermore the bolt 5 is threaded 9 so it can be screwed 25 into the wall.

The cone 7 may be an integrated or welded part of the anchor bolt 5, or a loose cone screwed onto the bolt. The 30 cone 7 may be made of aluminium, steel or the like. The screwable cone is furnished with an interior thread corresponding to the thread of the bolt 5, the bolt suitably being threaded all the way up to the eye 6. By such an arrangement the position of the cone 7 on the bolt 5 may be altered as required.

When using the invention one may in a normal way drill a number of holes in the wall which then are furnished with plugs. Then the socket is placed in e.g. a drill chuck (not shown) by means of the inlet pin 2. When the anchor bolts 35 5 then are to be screwed into the drilled and plugged holes in the building wall the eye 6 of the bolt 5 is placed in the recess 3, whereby the cone 7 cooperated with the chamfers 4 of the recess 3 in order to give a fast, reliable and stable contact between the anchor bolt 5 and the socket 1.

40 The screw part 9 of the anchor bolt 5 is adapted to the

actual use. It is thereby possible to use e.g. self-drilling bolts 5 for wood, concrete or lightweight concrete etc., with or without expander 11. Then there is no need for any pre-drilling. Examples of different anchor bolts 5 with different 5 kinds of threads 9 are shown in the Figs. 4a to 4h.

The chamfers 4 are largest at the edge of the socket and decrease inwardly of the socket 1 at the same angle as shown by the cone 7 on the anchor bolt 5. In this way a large contact surface is obtained between the socket 1 and the bolt 5 10 which functions as guide for the application of the socket on the bolt besides from stabilizing the screwing.

Besides from acting to guide the socket at the screwing in of the bolt the cone 7 furthermore acts stiffening for the bolt 5 itself. Furthermore, the cone 7 may assist in stiffening 15 of the attachment of the anchor bolt in the wall by abutting the wall.

A further advantage with the invention is that for anchor bolts 5 with not integrated cones 7, the cone may be post tensioned against the wall in order to further strengthen 20 the anchorage, making the plug in the wall expanding better, which gives a stronger anchorage. Furthermore it is possible, if necessary, to make the cone 7 bigger by e.g. design it with a straight part 14 after the cone. In order to facilitate 25 the post tensioning the cone 7, as well as the chamfers, may be hexagonal or octagonal or the straight, additional part 14 above may have the form of a nut. The cone is very important at lateral displacement or pressure from above for suspended scaffolding.

It is suitable to arrange some kind of attachment in the 30 socket 1, i.e. means which keep the bolt 5 in place even if the socket 1 is directed downwardly. There are many conceivable ways to arrange this keeping. The preferred way at present is to, in accordance with Fig. 5, integrate magnetic rods 10 in the socket, which magnets 10 are dimensioned in 35 order to securely hold the anchor bolts 5 within the socket 1.

In stead of magnets 10 the channels 3 of the socket 1 may be lined with raw rubber 12 in accordance with Figs. 6 and 7 whereby the friction between the eye 6 and the rubber 40 11 is enough to keep the bolt 5 in place. This is particular-

ly suitable when using hammer drills.

In order to be able to replace worn rubber coatings 12 the socket 1 may consist of two parts, with the two parts assembled by means of threads (not shown). The partition of 5 the socket can hereby be arranged on any side of the rubber elements 12. When the rubber elements 12 are to be replaced the socket is thus parted by screwing the two part from each other, the worn rubber coatings 12 are taken off and new are put in, whereafter the socket 1 once again is screwed together 10 and then is ready for use.

As a further alternative to the attachment for the bolt 5 in the socket 1 it is conceivable to use spring biased clips in the socket 1.

The bolts 5a and 5b according to the Figs. 4a and 4b, 15 respectively, are a self-drilling steel bolt and wood bolt, respectively.

The bolt according to Fig. 4c, which is intended for concrete is self-drilling 13c and has an expander 11c. When this bolt 5c has been screwed in by means of the socket 1 it 20 is post-tensioned by the cone 7c being screwed in whereby the expander 11c expands by being pushed onto the conically expanded part 15c behind the drill 13c. Such a bolt 5c gives a reliable anchorage and get its strength from several cooperating factors such as the pressure of the expander 11c against 25 the walls of the drilled hole and the abutment of the cone 7c against the wall in which the bolt 5c has been screwed in. It is possible to re-use this bolt 5c with the expander 11c. When herewith the bolt 5c is to be loosened the cone 7c is first loosened, then the bolt 5c is struck inwardly a distance 30 corresponding to the expansion of the expander 11c, whereby the expander 11c is compressed by springs arranged in the expander 11c. In order to support this movement a pin may be arranged affecting the springs. The outer surface of the expander 11c may furthermore have the shape of a drill in 35 order to remove material from the drilled hole at the screwing in. Also, this surface form gives the expander 11c a stronger abutment against the drilled hole. The expander 11c can be made of many different materials such as steel, aluminum, plastics or rubber. If rubber is used it is suitable to 40 arrange small spikes on the outer surface in order to remove

material from the drilled hole.

The bolt 5d according to Fig. 4d is a self-drilling 13d bolt 5d intended for lightweight concrete and is furnished with an expander 11d.

5 The bolt 5e according to Fig. 4e is a wood bolt with open eye 6e. By the special form of this eye 6e a special socket 1' must be used, which corresponds to the socket 1 above except that instead of the cruciformed inner recess 3 the socket 1' has a recess 3' adapted to the form of the eye 6e. In the example shown the socket 1' is furthermore furnished with magnetic rods 10.

In Fig. 4f a bolt 5f is shown, which is self-drilling 13f and is intended for lightweight concrete.

15 The bolt 5g according to Fig. 4g is a self-drilling 13g bolt 5g with expander 11g intended for concrete. The outer surface of the expander 11g has a form which corresponds to a drill in order to remove material from the drilled hole during the screwing in.

20 In Fig. 4h a bolt 5h is shown which is self-drilling 13h and has a divisible expander 11h with an outer "drill shaped" surface.

A further form of expander 11, which e.g. could be used with the bolt 5h according to Fig. 4h, is shown in section in Fig. 8. As is evident from the figure the inner surface of 25 the expander 11 is furnished with a wedge-shaped thread 15 adapted to the thread of the bolt 5. This expander is used as follows. When the bolt 5 has been drilled to the bottom with the cone 7, or its extension 14, abutting the wall the cone 7 is held with a wrench, then the bolt 5 is screwed out by 30 means of e.g. a screwdriver introduced through the eye 6. Thus expanding the expander by means of the wedge-shape of the thread 15. The more the bolt is screwed out the more the expander 11 tightens. When the bolt 5 then is screwed back in 35 the expander 11 retracts due to the thread 15. This makes it possible to then withdraw the bolt 5.

The different bolts 5a-h in the figures are shown as examples of how the invention may be used in different ways in practice, and persons skilled in the art realize that there are many different possibilities of variation concerning 40 dimension, selection of material, type of thread etc.

## CLAIMS

1. An anchorage arrangement consisting of a socket (1) and an anchor bolt (5) for use when anchoring e.g. scaffolds at walls or the like, the anchor bolt (5) being adapted for  
5 cooperation with the socket (1), which socket (1) is furnished with a insert pin (2) for connection with a drilling machine or the like, **characterized** in that the socket (1) has a cruciformed inner recess (3), which cruciformed inner recess (3) is furnished with chamfers (4) formed on each of  
10 the inner corners of the recess (3) and decreasing inwardly in the socket, the chamfers (4) cooperating with an extension in form of a cone (7) on the anchor bolt (5).

2. The anchorage arrangement of claim 1, **characterized** in that the anchor bolt (5) has an eye (6) and is threaded  
15 (9).

3. The anchorage arrangement of claims 1 or 2, **characterized** in that the cone (7) is an integrated part of the anchor bolt (5).

4. The anchorage arrangement of claims 1 or 2, **characterized** in that all of the anchor bolt (5) is threaded up to an eye (6) and in that the cone (7) is a separate part which can be screwed onto the bolt (5) and adjusted to a optional height on the bolt (5) for post-tension.

5. The anchorage arrangement of claims 2, 3 or 4, **characterized** in that the dimensions and angles of the chamfers (4) of the recess (3) in the socket (1) correspond to dimension and angle of the cone (7) of the bolt (5).

6. The anchorage arrangement of any of the previous claims, **characterized** in that the drilling element (13) is arranged at the end of the anchor bolt (5) whereby the bolt is self-drilling.

7. The anchorage arrangement of claim 6, **characterized** in that anchor bolt (5) is furnished with an expander (11).

8. The anchorage arrangement of any of the previous claims, **characterized** in that the socket (1) is furnished with integrated magnetic rods (10) in order to keep the anchor bolt (5) in place in the socket (1).

9. The anchorage arrangement of any of the claims 1 to 7, **characterized** in that the channels of the socket (1) are  
40 coated with rubber (12) in order to keep the anchor bolt (5)

in place in the socket (1) by means of friction action.

10. The anchorage arrangement of any of the previous claims, characterized in that the cone (7) is made of aluminum, steel or plastic.

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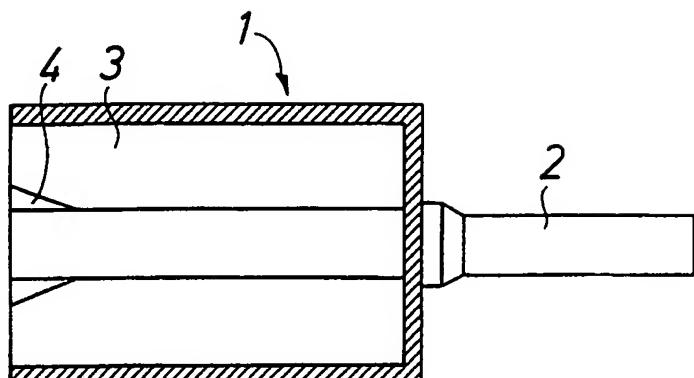


FIG. 1

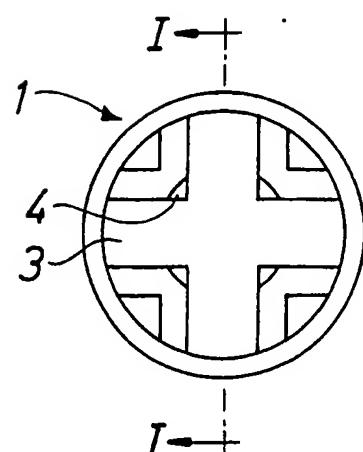


FIG. 2

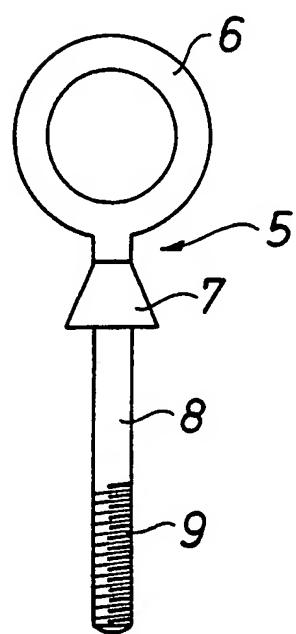


FIG. 3

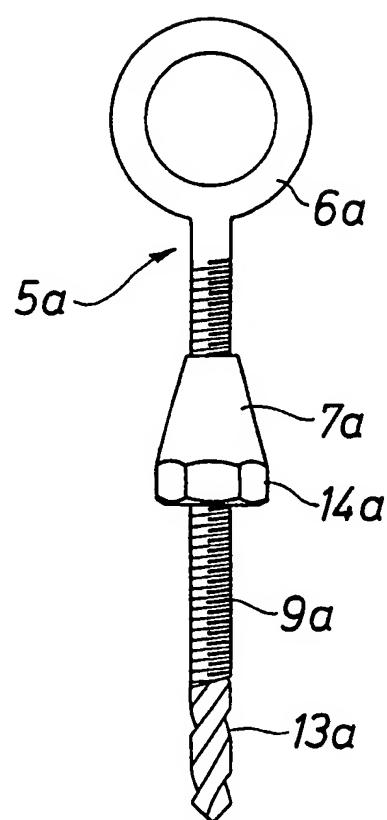


FIG. 4a

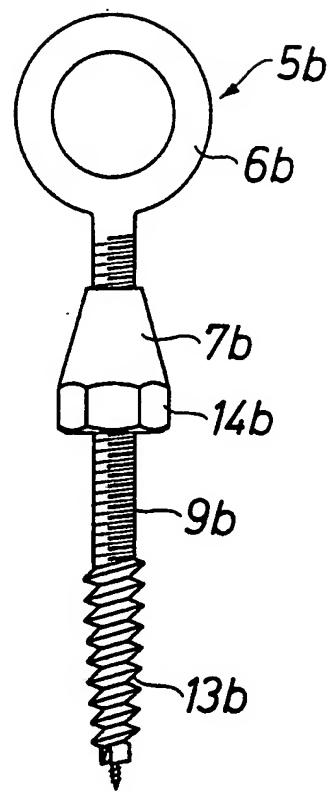


FIG. 4b

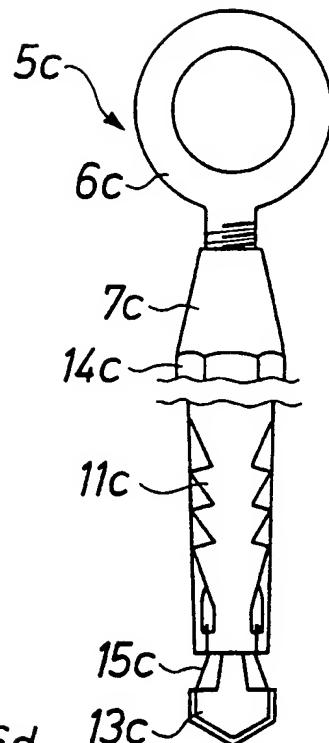


FIG. 4c

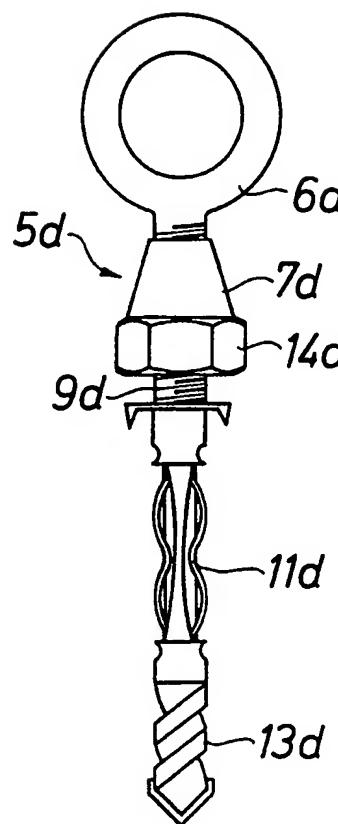
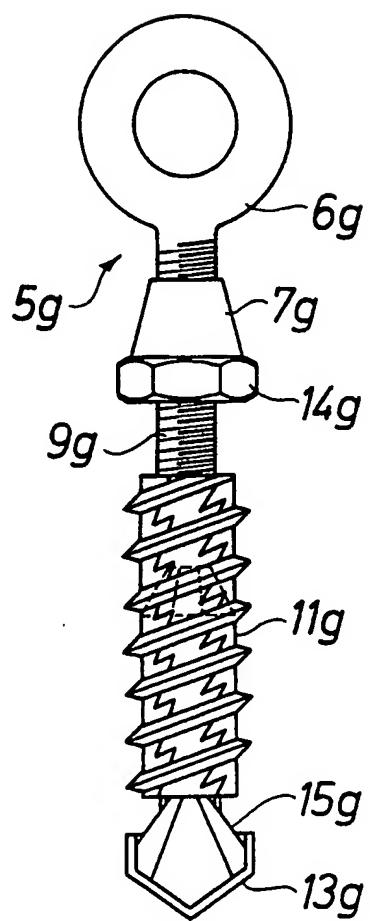
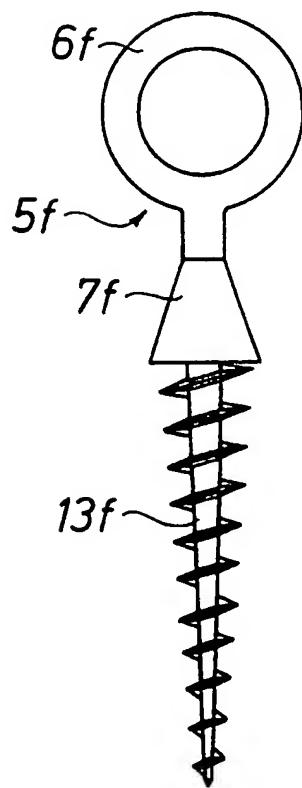
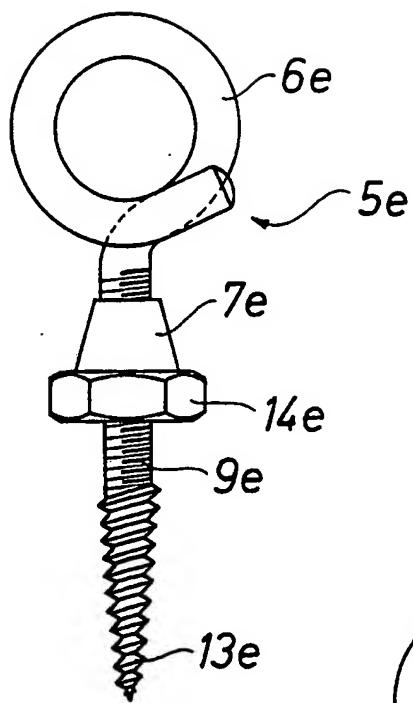


FIG. 4d



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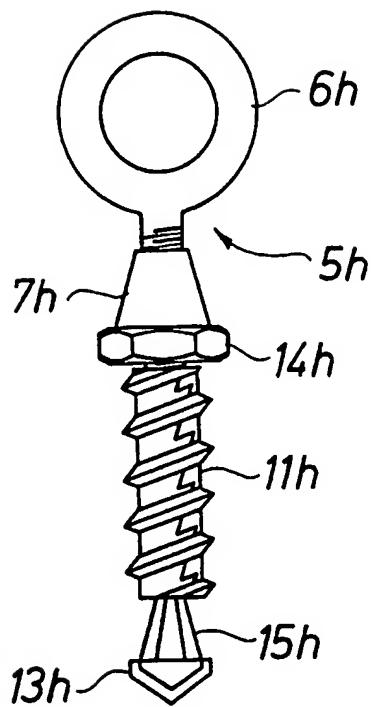


FIG. 4h

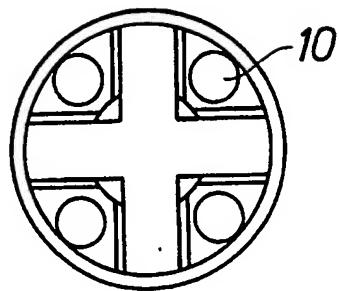


FIG. 5

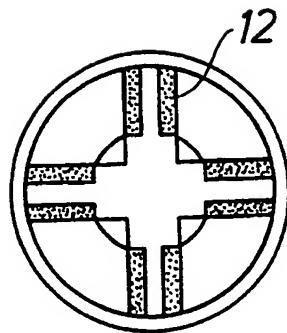
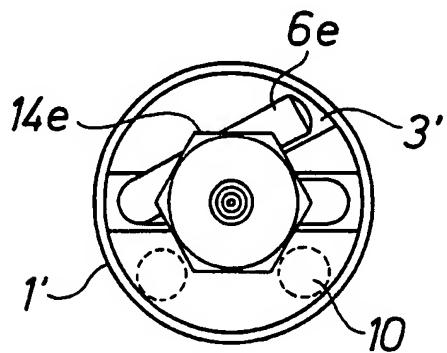
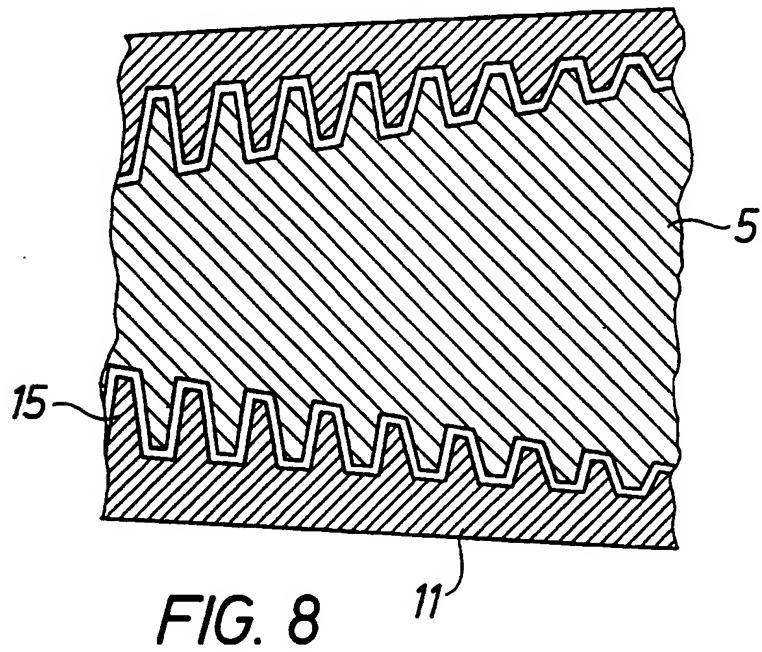
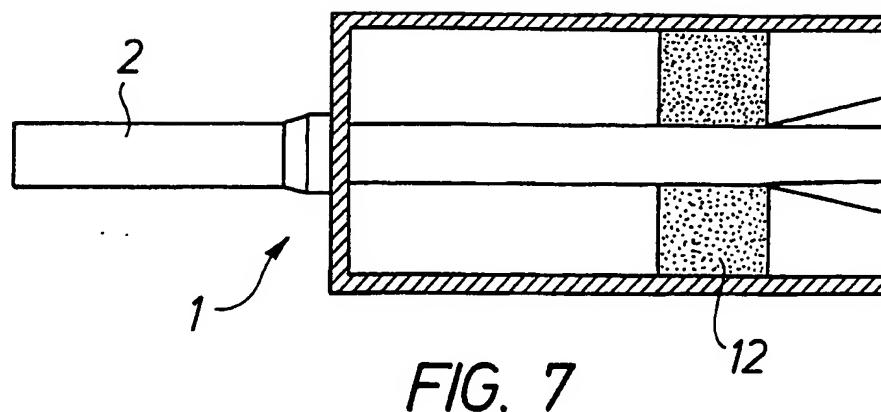


FIG. 6

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# INTERNATIONAL SEARCH REPORT

International Application No PCT/SE 92/00775

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC <b>IPC5: F 16 B 23/00, B 25 B 23/00 // E 04 G 5/04</b>		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
IPC5	<b>F 16 B; E 04 G; B 25 B</b>	
Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in Fields Searched <sup>8</sup>		
<b>SE,DK,FI,NO classes as above</b>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>		
Category <sup>10</sup>	Citation of Document <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
A	US, A, 4689881 (FALL) 1 September 1987, see column 3, line 55 - column 4, line 15; figures 3-7 --	1,2,6
A	US, A, 4764069 (REINWALL ET AL) 16 August 1988, see column 3, line 15 - line 59; figures 6-9 --	1,2,6
A	DE, C2, 2721870 (LAYHER, EBERHARD) 24 March 1983, see the whole document --	1,2
A	GB, A, 818530 (ALICK VANSITTART BOWATER) 19 August 1969, see page 1, line 8 - line 15; page 1, line 49 - line 52; figures 1-4 --	1,8
<p><b>* Special categories of cited documents:</b> <sup>10</sup></p> <p>"A" document defining the general state of the art which is not considered to be of particular relevance</p> <p>"E" earlier document but published on or after the international filing date</p> <p>"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)</p> <p>"O" document referring to an oral disclosure, use, exhibition or other means</p> <p>"P" document published prior to the international filing date but later than the priority date claimed</p> <p>"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention</p> <p>"X" document of particular relevance, the claimed invention cannot be considered novel or cannot be considered to involve an inventive step</p> <p>"Y" document of particular relevance, the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.</p> <p>"&amp;" document member of the same patent family</p>		
<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
10th February 1993	<b>07 FEBRUARY 1993</b>	
International Searching Authority	Signature of Authorized Officer	
SWEDISH PATENT OFFICE	Jesper Stenström	

III. DOCUMENTS CONSIDERED TO BE RELEVANT (CONTINUED FROM THE SECOND SHEET)		
Category	Citation of Document, with indication, where appropriate, of the relevant passages	Relevant to Claim No
A	Patent Abstracts of Japan, Vol 13, No 498, M890, abstract of JP 01-199774, publ 1989-08-11 (MATSUSHITA ELECTRIC IND CO LTD) --- -----	1,9

**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
ON INTERNATIONAL PATENT APPLICATION NO.PCT/SE 92/00775**

This annex lists the patent family members relating to the patent documents cited in the above-mentioned international search report.  
The members are as contained in the Swedish Patent Office EDP file on **08/01/93**.  
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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
US-A- 4689881	87-09-01	NONE		
US-A- 4764069	88-08-16	AU-B- 600096 AU-D- 1197688 CA-A- 1295861 DE-A- 3866263 EP-A-B- 0283185 JP-A- 63259211		90-08-02 88-09-15 92-02-18 92-01-02 88-09-21 88-10-26
DE-C2- 2721870	83-03-24	NONE		
GB-A- 818530	69-08-19	NONE		